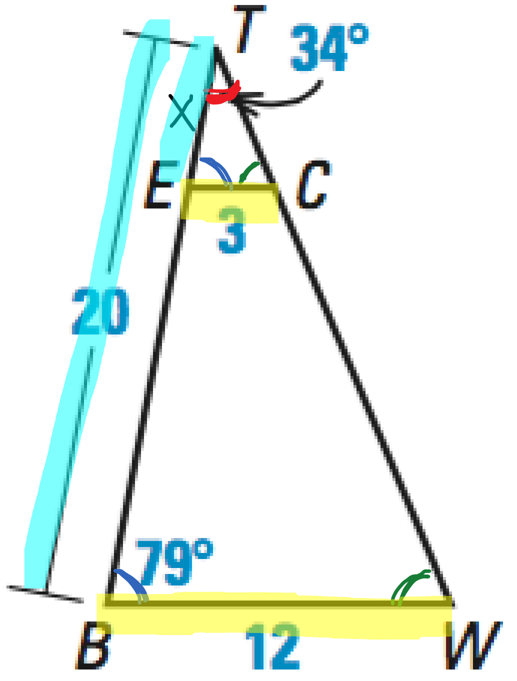
Chapter 8
Similarity

Section 4
Similar Triangles

GOAL 1: Identifying Similar Triangles

In this lesson, we will continue the study of similar polygons by looking at properties of similar triangles.

Example 1: Writing Proportionality Statements



In the diagram, $\Delta BTW \sim \Delta ETC$.

a) Write the statement of proportionality.

$$\frac{BT}{ET} = \frac{TW}{TC} = \frac{WB}{CE}$$

b) Find m<TEC.

$m\angle TEC = 79°$

c) Find ET and BE.

ET: $\frac{3}{12} = \frac{x}{20}$

$\frac{\cancel{12}x}{\cancel{12}} = \frac{60}{12} \rightarrow x = 5 \Rightarrow ET = 5$

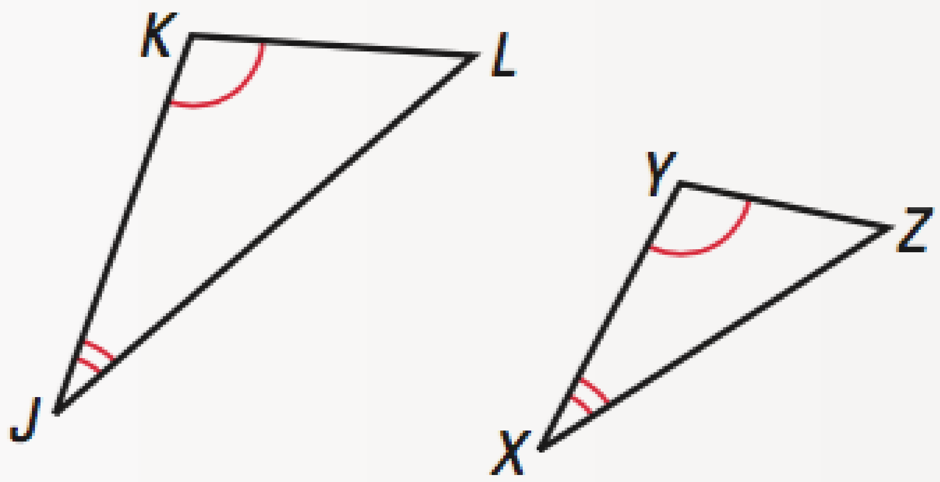
BE: $20 - 5 = 15$

POSTULATE

POSTULATE 25 ***Angle-Angle (AA) Similarity Postulate***

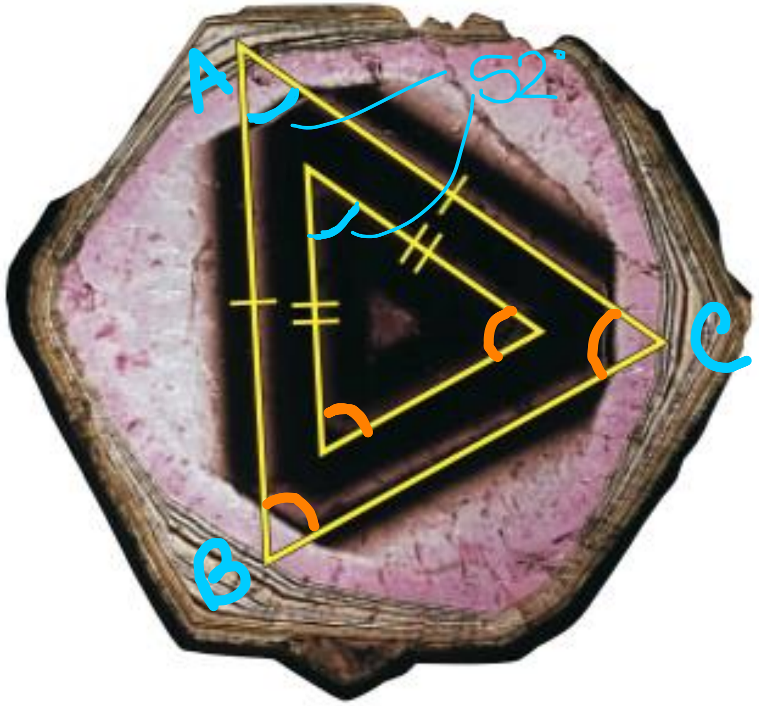
If two angles of one triangle are congruent to two angles of another triangle, then the two triangles are similar.

If $\angle JKL \cong \angle XYZ$ and $\angle KJL \cong \angle YXZ$, then $\triangle JKL \sim \triangle XYZ$.



Example 2: Proving that Two Triangles are Similar

Color variations in the tourmaline crystal shown lie along the sides of isosceles triangles. In the triangles each vertex angle measures 52°. Explain why the triangles are similar.

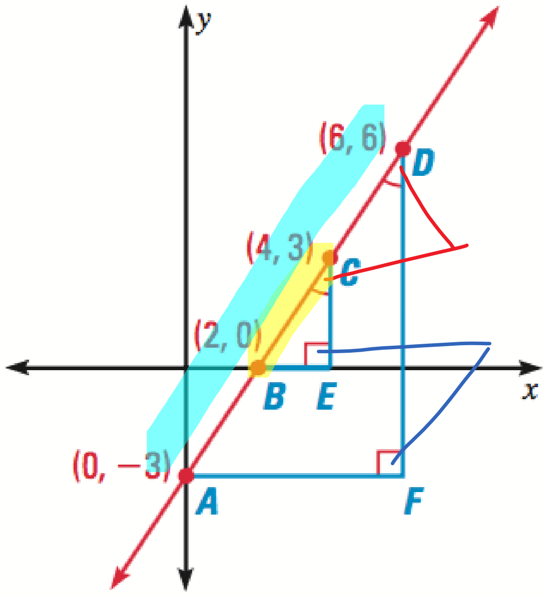


Vertex angle → 52*

Base angles → 180 – 52 = 128 / 2 = 64*

By AA → the triangles are similar

Example 3: Why a Line Has Only One Slope



Use properties of similar triangles to explain why any two points on a line can be use to calculate the slope. Find the slope of the line using both pairs of points shown.

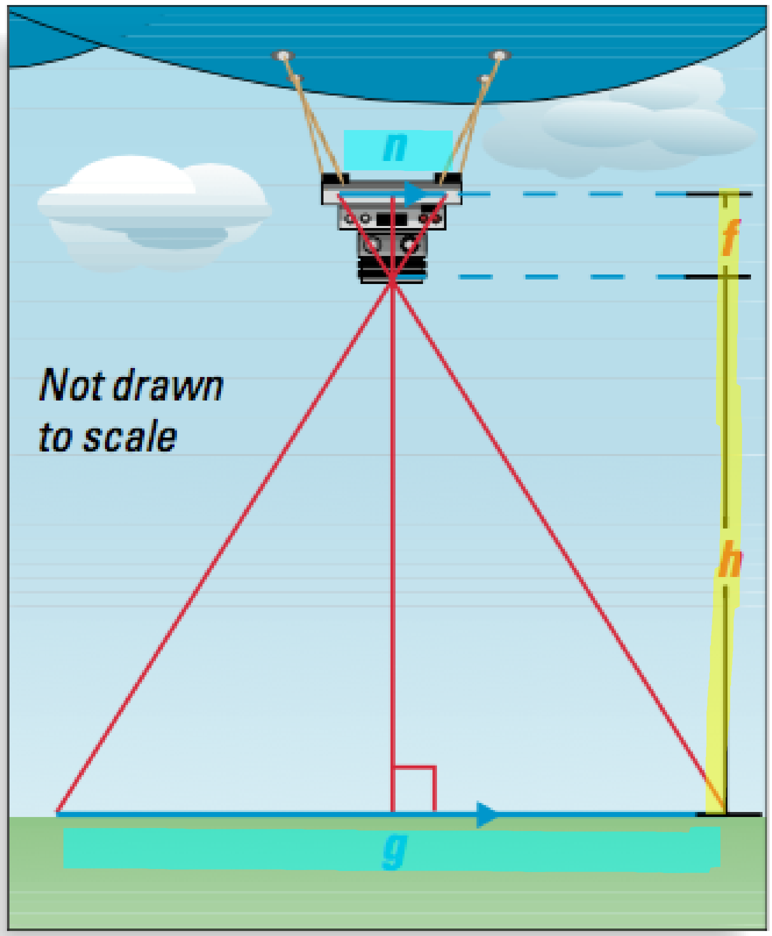
$$BC \rightarrow \frac{0-3}{2-4} \rightarrow \frac{-3}{-2} \rightarrow \frac{3}{2}$$

$$DA \rightarrow \frac{-3-6}{0-6} \rightarrow \frac{-9}{-6} \rightarrow \frac{3}{2}$$

GOAL 2: Using Similar Triangles in Real Life

Example 4: Using Similar Triangles

AERIAL PHOTOGRAPHY Low-level aerial photos can be taken using a remote-controlled camera suspended from a blimp. You want to take an aerial photo that covers a ground distance g of 50 meters. Use the proportion $\frac{f}{h} = \frac{n}{g}$ to estimate the altitude h that the blimp should fly at to take the photo. In the proportion, use $f = 8$ cm and $n = 3$ cm. These two variables are determined by the type of camera used.



$$\frac{8}{h} = \frac{3}{50}$$

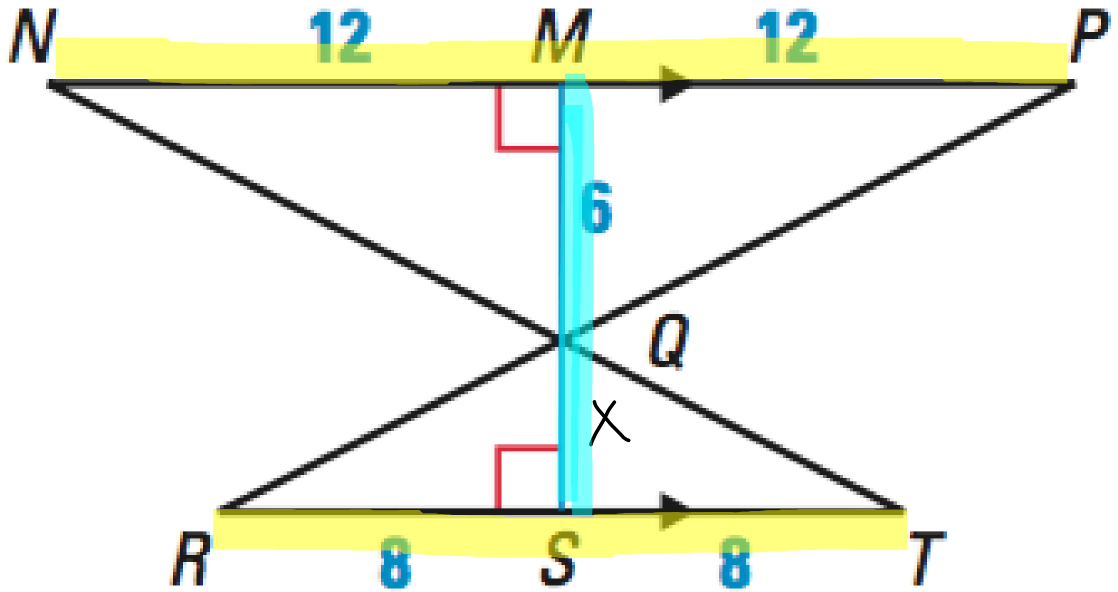
$$\frac{\cancel{3}h}{\cancel{3}} = \frac{400}{3}$$

$h = 133.3$ m

In Lesson 8.3, you learned that the perimeters of similar polygons are in the same ratio as the lengths of the corresponding sides. This concept can be generalized as follows. If two polygons are similar, then the ratio of *any two corresponding lengths* (such as altitudes, medians, angle bisector segments, and diagonals) is equal to the scale factor of the similar polygons.

Example 5: Using Scale Factors

Find the length of the altitude QS.



$$\frac{24}{16} = \frac{6}{x}$$

$$\frac{24x}{24} = \frac{96}{24} \rightarrow x = 4$$

EXIT SLIP